The work to be presented in the thesis entitled **'' Synthesis, Characterization and Biological Activity of Dibenzo[b,f][1,4]thiazepine Derivatives.''** has been divided into six chapters**.**

Chapter-1 introduces the topic and its current status. Since the last century, heterocycles have constituted one of the largest areas of research in organic and medicinal chemistry and have contributed to the development of society from a biological and industrial point of view as well as to the understanding of life processes and to the efforts to improve the quality of life. The presence of heterocycles in all kinds of organic compound is of interest such as in biology, pharmacology, optics, electronics, material sciences etc is very well known [1].

Group of heterocycles constitutes by far the largest of the classical divisions of organic chemistry. Apart from that they are of extreme importance not only biologically and industrially but also to the functioning of any developed human society also. Their involvement in a wide range of areas cannot be underestimated. The large numbers of pharmaceutical products that mimic natural products with biological activity are heterocycles [2].

Heterocycles play a vital role in biochemical reactions because the side groups of the most typical and essential constituents of living cells, DNA and RNA are based on aromatic heterocycles. Most of the significant advances against diseases have been made by designing and testing new structures which are often heterocyclic derivatives. Therefore, researchers are on a continuous pursuit to design and produce better pharmaceuticals, pesticides, insecticides, rodenticides and weedicides. A significant part of such biologically active compounds is composed of heterocycles [3].

During the last few decades, chemistry, synthesis and transformations of fused five member, six member and seven member heterocyclic compounds have received considerable attention and importance due to their remarkable and wide variety of applications. The development of simple, facile and efficient synthetic methods for the synthesis of such compounds from readily available reagents is one of the major challenges in organic synthesis.

Review of the work done on dibenzothiazepine derivatives and survey of its literature has been given. Different types of derivatives of dibenzo[*b*,*f*][1,4] thiazepin-11(10*H*)-one have been synthesized because dibenzo[*b*,*f*][1,4] thiazepin-11(10*H*)-one is the member of the [1,5] benzothiazepine class, which display not only important structural variety but biological [4] and pharmacological [5,6] properties also.

Inspired by the biological profile of 1, 5-benzothiazepine derivatives; work on biologically active of heterocycles was carried out in order to know the effect of 1, 5-benzothiazepines and their biological activity [7, 8]. Several naturally occurring and synthetic benzothiazepine derivatives have known to be associated with biological and pharmacological activities such as anti-inflammatory, anti-implantation, anticancer [9], pesticidal, antiuterotropic, antibacterial activities [10, 11]. Most of the synthetic methods used for their preparation are based on the reaction of unsaturated ketones with 2-aminothiophenol which provided the related tetra cyclic benzothiazepines synthesis based on MacLeod's procedure is well documented [12, 13].

Chapter-2 deals with synthesis, characterization and biological activities of dibenzothiazepinone derivatives. The development of heterocyclic scaffolds is a fast emerging subject in the medicinal chemistry. Because of the high mobility of reactive N-H

group compounds containing phenyl acetamide moiety are known to be useful synthetic scaffolds for designing of aziridines, lactams, piperazines [14-16]. N- Phenyl acetamide derivatives of pyrazole showed local anesthetic and anti- arrhythemic activities [17]. Derivatives of 2-chloro N-phenylacetamide reacted with different types of N-containing compound are extensively studied because of their significant pharmacological activities [18, 19].

The reaction of dibenzo[*b*,*f*][1,4] thiazepin-11(10*H*)-one with 2-chloro N-substituted phenyl acetamide in presence of catalytic amount of sodium hydride; gave 2-(dibenzo *[b,f]*[1,4]thiazepine11-yloxy)-N- substituted phenylacetamide derivatives and their antimicrobial activity has been studied.

Chapter-3 consists of schiff base derivatives and is divided into two sections. The chemistry of C=N has played a vital role in the progress of chemical sciences. These compounds found large number of applications in the field of chemistry. Schiff bases are produced by condensation of primary amines with carbonyl compounds and they were first reported by Hugo schiff in 1864[20]. The relative easiness of preparation, synthetic flexibility and the special property of C=N group, schiff bases are generally excellent chelating agents [21, 22]. Schiff base approach is one of the most promising amongst these. The literature survey revealed that Schiff bases are useful as starting material in the synthesis of important drugs such as antibiotic, antiallergic, anticancer, antipologistics and antitumorect and have diverse biological activities [23].

Section-I

In this section, 11-chloro dibenzo [*b,f*][1,4] thiazepine was prepared from dibenzo [*b,f*][1,4]thiazepin-11 (10*H*)-one, dimethyl aniline and $POCl_3$, which on further treatment with hydrazine hydrate gave 11-hydrazinyl dibenzo [*b,f*][1,4] thiazepine. The resulting 11-hydrazinyl dibenzo [*b,f*][1,4] thiazepine was treated with substituted aromatic aldehydes to give (*Z*)-11-(2-(substituted benzylidene) hydrazinyl) dibenzo [*b,f*][1,4]thiazepine.

Section-II

Methyl 10-methyl-11-oxo-10,11-dihydrodibenzo[b,f][1,4]thiazepine-8-carboxylate was treated with hydrazine hydrate that yielded 10-methyl-11-oxo-10,11-dihydrodibenzo[*b,f*] [1,4]thiazepine-8-carbohydrazide. The resulting 10-methyl-11-oxo-10,11-dihydrodibenzo [*b,f*][1,4]thiazepine-8-carbohydrazide was reacted with substituted aromatic aldehydes to give (E)-*N*'- substituted benzylidene-10-methyl-11-oxo-10,11-dihydrodibenzo[*b,f*][1,4] thiazepine -8-carbohydrazide.

Chapter-4 Azetidin-2-ones, commonly known as β-lactams are well-known heterocyclic compounds and possess pharmacological properties such as antibacterial, antituberculer and antifungal agents [24-26]. The Staudinger reaction is widely used in the preparation of β-lactams as it provides a direct access to such compounds from simple precursors [27]. There are two sections in this chapter describing synthesis of azetidinone derivatives.

Section-I

In this section, (*Z*)-11-(2-(substituted benzylidene) hydrazinyl) dibenzo [*b,f*][1,4]thiazepine was reacted with chloro acetyl chloride to give 3-chloro-1-(dibenzo[*b,f*][1,4]thiazepin-11-yl amino)-4-(substituted phenyl) azetidin-2-one.

Section-II

In this section, (E)-*N*'- substituted benzylidene-10-methyl-11-oxo-10,11-dihydro-dibenzo[*b,f*][1,4]thiazepine-8-carbohydrazide was reacted with chloro acetyl chloride to give *N*-(3-chloro-2-oxo-4-substituted phenylazetidin-1-yl)-10-methyl-11-oxo-10,11-dihydro dibenzo[*b,f*][1,4]thiazepine-8-carboxamide.

Chapter-5 There has been considerable interest in the chemistry of thiazolidin-4-one ring system, which is a core structure in various synthetic pharmaceuticals and displays a broad spectrum of biological activities [28, 29]. Among these type of molecules thiazolidine-4-one have been shown to have various important biological activities such as anti-convulsant, antidiarrheal, anti-diabetic, cardio protective, antiviral, antitubercular, anti HIV, antihistaminic, anticancer and analgesic properties [30-33]. The synthesis of thiazolidinone derivative has been divided into two parts as follows.

Section-I

In this section, (*Z*)-11-(2-(substituted benzylidene) hydrazinyl) dibenzo[*b,f*][1,4] thiazepine was reacted with thioglycolic acid to give 3-(dibenzo[*b,f*][1,4]thiazepin-11-ylamino)-2-(substituted phenyl) thiazolidin-4-one derivatives.

Section-II

In this section, (E)-*N*'- substituted benzylidene-10-methyl-11-oxo-10,11-dihydrodibenzo [*b,f*] [1,4]thiazepine -8-carbohydrazide was reacted with thioglycolic acid to give 10-methyl-11-oxo-*N*-(4-oxo-2-substituted phenylthiazolidin-3-yl)-10,11-dihydrodibenzo [*b,f*][1,4]thiazepine-8-carboxamide derivatives.

Chapter-6 presents synthesis and study of triazole derivatives. The chemistry of triazoles and their fused heterocyclic compounds have been the subject of extensive study since many years [34-37]. The derivatization of 1,2,4-triazole have showed a wide range of pharmacological activities such as antibacterial [38], anticancer [39]and antioxidant [40].

In this section, (*Z*)-11-(2-(substituted benzylidene) hydrazinyl) dibenzo [*b,f*][1,4]thiazepine was reacted with bromine in presence of acetic acid to give 3-subtituted phenyl dibenzo[b,f][1,2,4]triazolo[4,3-d][1,4]thiazepine derivatives.

The synthesized compounds described in chapter 2 to 5 characterized by elemental analysis and spectral analysis using IR, ^{1}H NHR, ^{13}C NMR and Mass spectra. All the synthesized compounds were screened for their in vitro antimicrobial properties. The results obtained have been presented and discussed. Some of the synthesized compounds gave very promising results.

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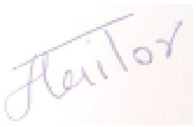

Jitesh H Tailor

Candidate

Dr. G. M. Mailk

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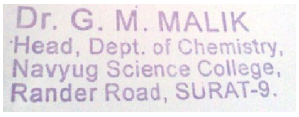
Supervisor